

**WE CLAIM:**

1. A process to produce an intermediate pressure steam from a high temperature process stream resulting from an aromatic carboxylic acid production process, said process comprising:
  - 5 (a) recovering thermal energy from at least a portion of said high temperature process stream in a first heat transfer zone to produce a low pressure steam; and
  - (b) compressing said low pressure steam in a compression zone to produce said intermediate pressure steam.
- 10 2. A process according to claim 1 wherein said low pressure steam has a pressure from about 0 psig to about 40 psig.
3. A process according to claim 2 wherein said intermediate pressure steam has a pressure in the range from about 50 psig to about 260 psig.
4. A process according to claim 1, 2 or 3 wherein said compression
- 15 zone comprises at least one compression device selected from the group consisting of a centrifugal compressor, a positive displacement compressor, and a steam ejector.
5. A process according to claim 4 wherein said intermediate pressure steam is superheated and wherein at least a portion of the superheat is
- 20 removed from said intermediate pressure steam.
6. A process according to claim 1, 2 or 3 wherein said compression zone comprises at least one steam ejector.

7. A process according to claim 6 wherein said steam ejector has a compression ratio of about 1.2 to about 2.0.
8. A process according to claim 7 wherein said high temperature process stream is at a temperature of greater than 100 °C.
- 5 9. A process according to claim 1 wherein said high temperature process stream is produced in a carboxylic acid production process and wherein the high temperature process stream is generated from an oxidation reactor, high pressure distillation column, vapor generated by an oxidation reactor, a water removal column, vapor generated by the crude  
10 TPA crystallizer, purified TPA crystallizer described, or vapor generated by purified TPA crystallizers.
10. A process according to claim 1 wherein said high temperature process stream is produced in a terephthalic acid production process.
11. A process to recover thermal energy from a high temperature  
15 process stream resulting from an aromatic carboxylic acid production process, said process comprising:
  - (a) recovering thermal energy from at least a portion of said high temperature process stream in a first heat transfer zone to produce a low pressure steam;
  - 20 (b) compressing said low pressure steam in a compression zone to produce an intermediate pressure steam;

(c) recovering thermal energy from at least a portion of said intermediate pressure steam in a second heat transfer zone to produce steam condensate; and

(d) optionally, recycling at least a portion of said steam

5 condensate to said first heat transfer zone.

12. A process according to claim 11 wherein said low pressure steam has a pressure from about 0 psig to about 40 psig.

13. A process according to claim 12 wherein said intermediate pressure steam has a pressure in the range from about 50 psig to about 260 psig.

10 14. A process according to claim 11, 12 or 13 wherein said compression zone comprises at least one compression device selected from the group consisting of a centrifugal compressor, a positive displacement compressor, and a steam ejector.

15 15. A process according to claim 14 wherein said intermediate pressure steam is superheated and wherein at least a portion of the superheat is removed from said intermediate pressure steam.

16. A process according to claim 11, 12 or 13 wherein said compression zone comprises at least one steam ejector.

20 17. A process according to claim 16 wherein said steam ejector has a compression ratio of about 1.2 to about 2.0.

18. A process according to claim 17 wherein said high temperature process stream is at a temperature of greater than 100°C.

19. A process according to claim 17 wherein said high temperature process stream is produced in a carboxylic acid production process and wherein the high temperature process stream is generated from an oxidation reactor, high pressure distillation column, vapor generated by an oxidation reactor, a water removal column, vapor generated by the crude TPA crystallizer, purified TPA crystallizer described, or vapor generated by purified TPA crystallizers.

20. A process according to claim 17 wherein said high temperature process stream is produced in a terephthalic acid production process.

21. A process to recover thermal energy from a high temperature process stream resulting from an aromatic carboxylic acid production process, said process comprising:

(a) recovering thermal energy from at least a portion of said high temperature process stream in a first heat transfer zone to produce a low pressure steam;

(b) compressing said low pressure steam in a compression zone to produce an intermediate pressure steam; wherein said compression zone comprises at least one steam ejector;

(c) recovering thermal energy from at least a portion of said intermediate pressure steam in a second heat transfer zone to produce steam condensate; and

(d) optionally recycling at least a portion of said steam condensate to said first heat transfer zone.

22. A process according to claim 21 wherein said low pressure steam has a pressure from about 0 psig to about 40 psig.
23. A process according to claim 22 wherein said intermediate pressure stream has a pressure in the range from about 50 psig to about 260 psig.
- 5 24. A process according to claim 21 wherein said steam ejector has a compression ratio of about 1.2 to about 2.0.
25. A process according to claim 21 wherein said high temperature process stream is at a temperature of greater than 100 °C.
26. A process according to claim 21 wherein said high temperature  
10 process stream is produced in a carboxylic acid production process and wherein the high temperature process stream is generated from an oxidation reactor, high pressure distillation column, vapor generated by an oxidation reactor, a water removal column, vapor generated by the crude TPA crystallizer, purified TPA crystallizer described, or vapor generated by  
15 purified TPA crystallizers.
27. A process according to claim 21 wherein said high temperature process stream is produced in a terephthalic acid production process.
28. A process to recover thermal energy from a high temperature process stream, said process comprising:
- 20 (a) recovering thermal energy from at least a portion of said high temperature process stream in a first heat transfer zone to produce a low pressure steam;

(b) compressing said low pressure steam in a compression zone to produce an intermediate pressure steam; wherein said compression zone comprises a compressor;

(c) removing at least a portion of superheat resulting from  
5 compression from said intermediate pressure steam;

(d) recovering thermal energy from at least a portion of said intermediate pressure steam in a second heat transfer zone to produce steam condensate; and

(e) optionally, recycling at least a portion of said steam  
10 condensate to said heat transfer zone.

29. A process according to claim 28 wherein said low pressure steam has a pressure from about 0 psig to about 40 psig.

30. A process according to claim 29 wherein said intermediate pressure steam has a pressure in the range from about 50 psig to about 260 psig.

15 31. A process according to claim 28, 29 or 30 wherein said compression zone comprises at least one compression device selected from the group consisting of a centrifugal compressor, and a positive displacement compressor.

32. A process according to claim 31 wherein said high temperature  
20 process stream is at a temperature of greater than 100 °C.

33. A process according to claim 28 wherein said high temperature process stream is produced in a carboxylic acid production process and wherein the high temperature process stream is generated from an

oxidation reactor, high pressure distillation column, vapor generated by an oxidation reactor, a water removal column, vapor generated by the crude TPA crystallizer, purified TPA crystallizer described, or vapor generated by purified TPA crystallizers.

5     34.     A process according to claim 28 wherein said high temperature process stream is produced in a terephthalic acid production process.

35.     A process to recover thermal energy from a high temperature process stream, said process comprising:

          (a)     oxidizing an aromatic feedstock with a reaction mixture in a  
10     reaction zone to form an aromatic carboxylic acid-rich stream and a gaseous mixture;

          (b)     removing in a separation zone a substantial portion of a solvent from said gaseous mixture to form said high temperature process stream and a solvent rich stream;

15           (c)     recovering thermal energy from at least a portion of said high temperature process stream in a first heat transfer zone to produce a low pressure steam;

          (d)     compressing said low pressure steam in a compression zone to produce an intermediate pressure steam; and

20           (e)     recovering thermal energy from at least a portion of said intermediate pressure steam in a second heat transfer zone to produce steam condensate;

(f) optionally recycling at least a portion of said steam condensate to said heat transfer zone.

36. A process according to claim 35 wherein said low pressure steam has a pressure from about 0 psig to about 40 psig.

5 37. A process according to claim 35 wherein said intermediate pressure stream has a pressure in the range from about 50 psig to about 260 psig.

38. A process according to claim 35, 36 or 37 wherein said compression zone comprises at least one compression device selected from the group consisting of a centrifugal compressor, a positive displacement compressor,  
10 and a steam ejector.

39. A process according to claim 38 wherein said intermediate pressure steam is superheated and wherein at least a portion of the superheat is removed from said intermediate pressure steam.

40. A process according to claim 35, 36 or 37 wherein said compression  
15 zone comprises at least one steam ejector.

41. A process according to claim 39 wherein said steam ejector has a compression ratio of about 1.2 to about 2.0.

42. A process according to claim 40 wherein said high temperature process stream is at a temperature of greater than 100°C.

20 43. A process according to claim 35 wherein said high temperature process stream is produced in a carboxylic acid production process and wherein the high temperature process stream is generated from an oxidation reactor, high pressure distillation column, vapor generated by an



oxidation reactor, a water removal column, vapor generated by the crude TPA crystallizer, purified TPA crystallizer described, or vapor generated by purified TPA crystallizers.

44. A process according to claim 35 wherein said high temperature  
5 process stream is produced in a terephthalic acid production process.